

No.

9200076



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Kansas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS SEED OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'KS4390'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 31st day of March in the year of our Lord one thousand nine hundred and ninety-five.

Attest:

Kenneth Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Samuel J. Hittman
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate) Kansas Agricultural Experiment Station		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO. K1119	3. VARIETY NAME KS4390
4. ADDRESS (street and no. or R.F.D. no., city, state, and ZIP) Waters Hall Kansas State University Manhattan, KS 66506		5. PHONE (Include area code) 913 532-6147	
6. GENUS AND SPECIES NAME Glycine max		7. FAMILY NAME (Botanical) Leguminosae	
8. CROP KIND NAME (Common Name) Soybean		9. DATE OF DETERMINATION 5/1/91	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) University			
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Vernon A. Schaffer, Department of Agronomy Kansas State University, Throckmorton Hall Manhattan, KS 66506-5501			
PHONE (Include area code):			
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse) <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety. b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement. c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety. d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety. e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership. f. <input checked="" type="checkbox"/> Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office _____ g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,150) made payable to "Treasurer of the United States." 			
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See section 83(a) of the Plant Variety Protection Act.) <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> YES (If "YES," answer items 16 and 17 below) <input type="checkbox"/> NO (If "NO," skip to item 18 below) </div>			
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> YES (If "YES," through <input type="checkbox"/> Plant Variety Protection Act <input checked="" type="checkbox"/> NO </div>			
19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> YES (If "YES," give names of countries and dates) USA, 1991 <input type="checkbox"/> NO			
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s)) 		CAPACITY OR TITLE Associate Director of Kansas Ag Experiment Station	
SIGNATURE OF APPLICANT (Owner(s))		CAPACITY OR TITLE	
DATE 1/15/92		DATE	

Exhibit A. Origin and Breeding History of 'KS4390' Soybean

1. KS4390 is an F_4 selection from the cross K1022 x Essex. K1022 is an F_4 -derived line from the cross Williams x Columbus. The original cross was made in 1977. F_1 , F_2 , and F_4 generations were grown in the field, the F_3 generation was grown in a winter nursery. F_2 and F_3 generations were advanced by single-seed descent. Single-plant selections were made in the F_4 generation.
2. KS4390 was evaluated in replicated yield trials for three years in KS, followed by evaluation in the USDA ARS Northern 1985 and 1986 Uniform tests.
3. KS4390 is stable. When sexually reproduced the variety remains unchanged in its essential and distinctive characteristic.
4. KS4390 is uniform. Variants are limited to slightly taller plants, and slightly later plants which occur at a frequency of less than 1 in 10,000. Rouging with the objective of eliminating those off-types continues. The variants, as well as typical plants, are commercially acceptable.

Exhibit B. Novelty Statement

9200076
Corrected 8/1/92 W.T. Scheybal

'KS4390' is most similar to 'Sparks'. KS4390 differs from Sparks in the following characteristics:

1. KS4390 matures 2 days later than Sparks.
2. KS4390 has purple flowers in contrast to the white flower of Sparks.
3. KS4390 is susceptible to phytophthora root rot while Sparks is resistant to races 1 and 2.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT C
(Soybean)

PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

OBJECTIVE DESCRIPTION OF VARIETY
SOYBEAN (*Glycine max* L.)

NAME OF APPLICANT(S) Kansas Agricultural Experiment Station	TEMPORARY DESIGNATION K1119	VARIETY NAME KS4390
ADDRESS (Street and No., or R.F.D. No., City, State, and Zip Code) Kansas State University Waters Hall Manhattan, KS 66506		FOR OFFICIAL USE ONLY PVPO NUMBER 9200076

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g.,). Starred characters ★ are considered fundamental to an adequate soybean variety description. Other characters should be described when information is available.

1. SEED SHAPE:



1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)

2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

★ 2. SEED COAT COLOR: (Mature Seed)

1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other (Specify) _____

3. SEED COAT LUSTER: (Mature Hand Shelled Seed)

1 = Dull ('Corsoy 79'; 'Braxton') 2 = Shiny ('Nebsoy'; 'Gasoy 17')

★ 4. SEED SIZE: (Mature Seed)

Grams per 100 seeds

★ 5. HILUM COLOR: (Mature Seed)

1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other (Specify) _____

★ 6. COTYLEDON COLOR: (Mature Seed)

1 = Yellow 2 = Green

★ 7. SEED PROTEIN PEROXIDASE ACTIVITY:

1 = Low 2 = High

★ 8. SEED PROTEIN ELECTROPHORETIC BAND:

1 = Type A (SP1^a) 2 = Type B (SP1^b)

★ 9. HYPOCOTYL COLOR:

1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

★ 10. LEAFLET SHAPE:

1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other (Specify) _____

11. LEAFLET SIZE:

☐ 11 = Small ('Amsoy 71'; 'A5312')
3 = Large ('Crawford'; 'Tracy')

2 = Medium ('Corsoy 79'; 'Gasoy 17')

12. LEAF COLOR:

☐ 21 = Light Green ('Weber'; 'York')
3 = Dark Green ('Gnome'; 'Tracy')

2 = Medium Green ('Corsoy 79'; 'Braxton')

★ 13. FLOWER COLOR:

☐ 2

1 = White

2 = Purple

3 = White with purple throat

★ 14. POD COLOR:

☐ 1

1 = Tan

2 = Brown

3 = Black

★ 15. PLANT PUBESCENCE COLOR:

☐ 2

1 = Gray

2 = Brown (Tawny)

16. PLANT TYPES:

☐ 11 = Slender ('Essex'; 'Amsoy 71')
3 = Bushy ('Gnome'; 'Govan')

2 = Intermediate ('Amcor'; 'Braxton')

★ 17. PLANT HABIT:

☐ 3

1 = Determinate ('Gnome'; 'Braxton')

2 = Semi-Determinate ('Will')

3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

★ 18. MATURITY GROUP:

☐ 0 ☐ 7

1 = 000

2 = 00

3 = 0

4 = I

5 = II

6 = III

7 = IV

8 = V

9 = VI

10 = VII

11 = VIII

12 = IX

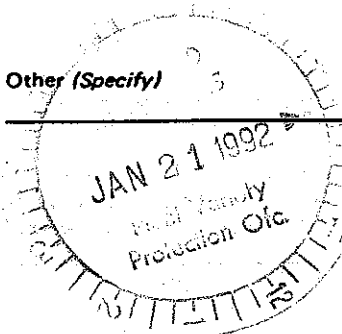
13 = X

★ 19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

BACTERIAL DISEASES:

★ ☐ 2 Bacterial Pustule (*Xanthomonas phaseoli* var. *sojensis*)★ ☐ 1 Bacterial Blight (*Pseudomonas glycines*)★ ☐ 0 Wildfire (*Pseudomonas tabaci*)

FUNGAL DISEASES:

★ ☐ 0 Brown Spot (*Septoria glycines*)Frogeye Leaf Spot (*Cercospora sojae*)★ ☐ 0 Race 1 ☐ 0 Race 2 ☐ 0 Race 3 ☐ 0 Race 4 ☐ 0 Race 5 ☐ 0 Other (Specify)☐ 0 Target Spot (*Corynespora cassicola*)☐ 0 Downy Mildew (*Peronospora trifoliorum* var. *manshurica*)☐ 0 Powdery Mildew (*Microsphaera diffusa*)★ ☐ 1 Brown Stem Rot (*Cephalosporium gregatum*)☐ 0 Stem Canker (*Diaporthe phaseolorum* var. *caulivora*)

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

FUNGAL DISEASES: (Continued)

- ★ ☐ 1 Pod and Stem Blight (*Diaporthe phaseolorum* var. *sojae*)
- ☐ 1 Purple Seed Stain (*Cercospora kikuchii*)
- ☐ 0 Rhizoctonia Root Rot (*Rhizoctonia solani*)
- Phytophthora Rot (*Phytophthora megasperma* var. *sojae*)
- ★ ☐ 1 Race 1 ☐ 0 Race 2 ☐ 0 Race 3 ☐ 1 Race 4 ☐ 0 Race 5 ☐ 0 Race 6 ☐ 0 Race 7
- ☐ 0 Race 8 ☐ 0 Race 9 ☐ 0 Other (Specify) _____

VIRAL DISEASES:

- ☐ 0 Bud Blight (Tobacco Ringspot Virus)
- ☐ 0 Yellow Mosaic (Bean Yellow Mosaic Virus)
- ★ ☐ 0 Cowpea Mosaic (Cowpea Chlorotic Virus)
- ☐ 0 Pod Mottle (Bean Pod Mottle Virus)
- ★ ☐ 1 Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

- Soybean Cyst Nematode (*Heterodera glycines*)
- ★ ☐ 1 Race 1 ☐ 1 Race 2 ☐ 1 Race 3 ☐ 1 Race 4 ☐ Other (Specify) _____
- ☐ 1 Lance Nematode (*Hoplolaimus Colomus*)
- ★ ☐ 1 Southern Root Knot Nematode (*Meloidogyne incognita*)
- ★ ☐ 1 Northern Root Knot Nematode (*Meloidogyne Hapla*)
- ☐ 1 Peanut Root Knot Nematode (*Meloidogyne arenaria*)
- ☐ 1 Reniform Nematode (*Rotylenchulus reniformis*)
- ☐ OTHER DISEASE NOT ON FORM (Specify): _____

20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

- ★ ☐ 1 Iron Chlorosis on Calcareous Soil
- ☐ Other (Specify) _____

21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

- ☐ 0 Mexican Bean Beetle (*Epilachna varivestis*)
- ☐ 0 Potato Leaf Hopper (*Empoasca fabae*)
- ☐ 0 Other (Specify) _____

22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	Amsoy 71	Seed Coat Luster	Sparks
Leaf Shape	Sparks	Seed Size	Ripley
Leaf Color	Sparks	Seed Shape	Spencer
Leaf Size	Amsoy 71	Seedling Pigmentation	Williams

23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison Data

VARIETY	NO. OF DAYS MATURITY	PLANT LODGING SCORE	CM PLANT HEIGHT	LEAFLET SIZE		SEED CONTENT		SEED SIZE G/100 SEEDS	NO. SEEDS/POD
				CM Width	CM Length	% Protein	% Oil		
Submitted	129	1.5	99.1	5.5	7.1	36.0	19.9	13.5	2.82
Sparks Name of Similar Variety	127	1.9	106.7	7.1	9.3	35.6	20.1	17.4	2.40

PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:

1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.
2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.
3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-A₂ in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.
4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.

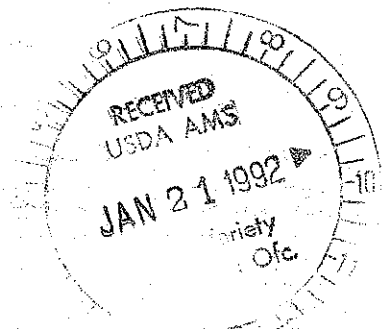


Exhibit D. Additional Description of Variety

Throughout 5 years of testing in KS, KS4390 has tended to mature a few days later, been slightly shorter, and less susceptible to lodging than Sparks (Table 1).

In Uniform tests, KS4390 was classified as being resistant to bacterial pustule (Table 2), but susceptible to brown stem rot (Tables 2 and 5), phytophthora root rot (Table 3) and iron chlorosis (Table 5). Seed size of KS4390 tends to be smaller in comparison to Sparks and many other maturity group IV cultivars (Tables 4 and 7).

Exhibit D:

Table 1. Performance of KS4390 across 42 tests in Kansas, 1985-1989.				
	Yield	Maturity	Lodging	Height
	bu/a	mo.-day	score ¹	in.
KS4390	52.1 a ²	9-30 a	1.5 b	39 b
Sparks	48.7 b	9-28 b	1.9 c	42 a
Spencer	49.3 b	9-29 b	1.4 a	38 b

1. 1 = almost all plants erect, 2 = all plants leaning slightly or a few plants down.
2. Means followed by the same letter are not significantly different at the 0.05 level of probability.

Exhibit D. Table 2

PRELIMINARY TEST IVB, 1985 DESCRIPTIVE AND DISEASE DATA								
Strain	Descriptive Code		Shattering Score Eldorado		Shattering Score	BP Eldorado	BSR	
			10/4	11/8	Manhattan	Reaction	Plant N %	Stem N %
Sparks (IV)	WTTSYBL	I	3.0	4.0	1.0	R	100	51.0
Williams 82 (III)	WTTSYBL	I	1.0	2.0	1.0	R	90	52.5
C1662	WTBDYBr	I	2.5	4.0	1.0	S	100	62.3
C1665	WGTDYBf	I	1.0	2.0	1.0	R	80	42.0
C1666	WTTSYBL	I	1.0	2.5	1.0	R	80	42.7
C1683	PTBDYBr	I	1.0	2.0	1.0	-	60	17.6
C1685	PTTSYBL	I	1.0	1.0	1.0	R	80	43.8
K1117	PTBDYBL	I	2.0	2.0	1.0	S	60	37.1
K1118	WTBDYBL	I	1.0	2.0	1.0	R	70	33.0
K1119	PTTSYIb	I	1.0	2.5	1.0	R	60	37.0
HC77-2204	PGTSYBf	D	1.0	3.0	1.0	-	100	56.7
C1668	PTTSYBL	D	2.3	2.0	1.0	-	50	26.1
C1670	PTTSYBL	D	1.0	1.0	1.0	-	30	14.6
C1673	P+WTTDYBL	D	1.5	3.0	1.0	-	70	42.8
HC78-1922	PTTSYBr	D	2.0	2.0	1.0	-	100	62.8
HC79-1264	PTTDYBL	D	2.5	2.5	1.0	-	90	57.0
HC79-3962	PTTSYBL	D	1.0	1.0	1.0	-	70	47.7
HC80-256	PTTSYBL	D	1.8	2.0	1.0	-	80	69.6
HC80-1420	WTTDYBL	D	2.5	3.0	1.0	-	60	38.6
HC80-1626	WTTDYBL + Br	D	1.0	3.0	1.0	-	100	73.2
HC80-2272	PTTSYBL	D	3.3	3.5	1.0	-	70	43.6
HC80-5894	PTTSYBL	D	1.5	1.5	1.0	-	100	81.6
HC81-799	PTTSYBL	D	1.5	1.0	1.0	-	100	46.5
HC81-817	WTTSYBL	D	1.3	1.5	1.0	-	100	68.4
HC81-4234	PTTDYBL	D	1.5	2.0	1.0	-	90	46.1
HC81-4556	WTTSYBL	D	2.0	2.5	1.0	-	90	64.0
HC81-4561	WTTSYBL	D	1.5	2.0	1.0	-	80	37.5
HC82-6073	P+WTBDYBL	D	1.5	2.0	1.0	-	100	55.9

Descriptive Code: 1 2 3 4 5 6

1 = Flower color: Purple, White2 = Pubescence Color: Tawny, Gray, Light Tawny3 = Pod Color: Brown, Tan4 = Seed Coat Luster: Dull, Shiny, Intermediate5 = Seed Coat Color: Yellow6 = Hilum Color: Black, Imperfect black, Brown, Buff, Gray, Tan, Yellow

Exhibit D. Table 3.

PRELIMINARY TEST IVB, 1985 DISEASE DATA							
Strain	PR			PS	PSB	SMV	Germ
	Ames	Lafayette	Vickery				
	Race 4 -- Reaction --	Race 1	Tolerance Score	a %	n %	a Score	%
Sparks (IV)	S	R	2.4	16	22	5E	74
Williams 82 (III)	R	R	2.5	13	0	5M	92
C1662	S	R	2.6	17	6	1	84
C1665	S	S	2.4	20	0	1	99
C1666	R	R	2.3	15	12	5E	82
C1683	H	R	2.5	5	14	4E	80
C1685	R	R	2.4	14	4	5E	92
K1117	S	R	2.6	15	4	1	94
K1118	S	R	2.4	13	28	5E	60
K1119	S	S	2.9	6	2	3E	96
HC77-2204	S	R	2.3	1	0	3E	99
C1668	S	H	3.1	7	0	2E	99
C1670	R	R	2.5	2	0	4E	90
C1673	S	S	3.5	10	4	5E	86
HC78-1922	S	S	2.9	7	2	1	96
HC79-1264	S	S	3.1	9	4	3M	96
HC79-3962	S	S	3.0	7	0	3M	96
HC80-256	S	S	3.5	10	0	3E	90
HC80-1420	S	S	3.3	3	6	1	88
HC80-1626	S	S	2.4	6	2	2E	66
HC80-2272	S	S	3.3	15	0	1	80
HC80-5894	S	S	2.9	5	2	1	90
HC81-799	S	S	2.9	5	4	2M	90
HC81-817	S	S	3.3	1	0	1	96
HC81-4234	S	S	2.6	8	0	4M	92
HC81-4556	S	S	3.0	5	4	5E	84
HC81-4561	S	S	3.5	33	0	5E	98
HC82-6073	S	S	2.8	7	0	2M	96

Exhibit D. Table 4

PRELIMINARY TEST IVB, 1985 Regional Summary									
Strain	Yield	Rank	Maturity	Lodging	Plant Height	Seed Quality	Seed Size	Composition Protein	Oil
No. of Tests	7 bu/a	7 No.	7 Date	7 Score	7 in.	7 Score	7 g/100	5 %	5 %
Sparks	44.2	17	9-25.6	2.1	39	3.1	17.4	39.7	22.3
Williams 82 (III)	46.3	10	-0.6	1.7	36	2.6	17.5	42.0	21.9
C1662	44.0	22	0.0	1.6	38	3.2	18.4	41.6	22.2
C1665	48.3	3	+2.3	1.5	37	2.6	16.8	40.1	22.4
C1666	44.1	20	-1.6	1.5	37	2.4	17.3	41.7	22.2
C1683	44.2	17	-1.1	1.7	34	2.5	16.2	42.9	21.2
C1685	44.2	17	-0.1	1.5	40	2.7	16.2	43.6	20.9
K1117	46.7	8	-1.0	2.5	37	2.8	17.9	41.2	22.3
K1118	42.5	25	+5.6	1.8	37	3.5	17.5	41.6	21.8
K1119	46.6	9	+3.4	1.6	39	2.0	13.5	40.9	21.6
HC77-2204	51.0	1	+0.9	1.5	26	1.7	13.9	39.4	21.9
C1668	45.3	14	-1.1	1.3	22	2.7	16.3	42.0	22.3
C1670	45.7	12	-0.1	1.2	23	2.0	15.0	42.1	21.3
C1673	44.7	16	+0.6	1.9	29	2.9	14.7	38.9	22.9
HC78-1922	41.0	26	-0.4	1.3	21	2.4	15.2	43.2	21.5
HC79-1264	45.6	13	+1.6	1.3	23	2.4	17.5	42.7	22.0
HC79-3962	46.8	7	+0.3	1.2	24	2.3	14.6	40.2	21.6
HC80-256	45.1	15	+0.4	1.4	21	2.4	15.5	41.1	21.6
HC80-1420	42.6	24	+1.1	1.2	20	2.7	16.8	43.3	21.9
HC80-1626	40.5	28	+3.4	1.4	22	2.6	17.8	43.3	21.0
HC80-2272	42.9	23	-4.0	1.3	21	2.1	16.8	43.6	21.6
HC80-5894	40.9	27	+0.6	1.4	20	2.1	16.5	42.4	22.1
HC81-799	48.1	4	+0.1	2.5	25	2.1	16.1	39.8	22.5
HC81-817	49.0	2	+1.3	1.7	22	2.1	17.3	41.1	22.4
HC81-4234	46.2	11	+0.6	1.1	21	2.1	16.6	43.6	21.3
HC81-4556	47.5	5	+1.3	1.2	23	2.2	19.4	41.7	21.8
HC81-4561	44.1	20	+0.4	1.2	22	2.4	18.8	41.4	22.5
HC82-6073	47.2	6	+2.6	1.6	23	2.1	16.1	43.0	21.8

*126 Days After Planting

None of the determinate strains in this test had higher seed yields than the check variety Ripley (HC77-2204). Three indeterminate strains were higher yielding than the indeterminate check varieties. As in preliminary test IVA, there was a wide range in lodging scores at Eldorado in 1985.

Exhit D. Table 5.

UNIFORM TEST IV, 1986 DESCRIPTIVE AND DISEASE DATA								
Strain	Descriptive Code	Chlorosis Score			Shattering Score	BSR		
						Ames		St. Paul
			Ames	Lamberton		Plant N %	Stem N %	Plant N %
Douglas	WTSSYBL	I	3.0	3	1	100	95.0	50
Pyramid	PGTSYIb	I	3.7	5	1	100	95.6	-
Ripley	PGTSYBL	D	3.2	4	1	100	97.5	70
Chamberlain (III)	PTBSYBL	I	2.8	4	2	100	88.4	-0-
Morgan (IV)	WTDDYBL	I	2.5	3	2	100	91.3	50
C1653	STBDYBr	I	2.7	4	1	100	96.3	-0-
C1657	PTBDYBL	I	2.5	3	2	100	87.6	50
C1665	WGBDYBf	I	3.0	5	-	100	95.5	70
HC80-592	WTTSYBL	D	2.7	4	1	100	98.1	50
HC81-799	PTTSYBL	D	3.7	3	1	100	100.0	50
HC81-817	WTTSYBL	D	3.3	4	-	100	97.5	50
K1106	STDDYBL	I	3.0	5	1	100	91.1	60
K1119	PTDDYIb	I	2.8	4	2	100	94.8	70
LN82-2366	P + WGTSYBf	I	3.2	5	1	100	88.9	50
LN82-4433	PRBDYBL	I	3.3	2	1	100	96.1	20
LS80-6521	PTDDYBL	I	2.5	4	1	100	86.7	60
MD80-112-1	WTBSYBL	I	3.5	3	1	100	81.9	50
Md81-0953	STTSYBr	I	2.2	5		100	85.4	50

UNIFORM TEST IV, 1986 DISEASE DATA							
	BTS	Mottling PS		PR	PS	PSB	SMV
	Ames	Orange		Vickery	Lafayette		
Strain	a Score	%	%	Tolerance Score	a %	a %	a Score
Douglas	4	8	0	3.4	31	58	3E
Pyramid	5	36	0	2.8	29	62	5E
Ripley	3	0	0	2.6	2	14	3E
Chamberlain (III)	4	6	0	2.8	9	34	5S
Morgan (IV)	4	18	0	3.2	5	56	5E
C1653	3	0	0	3.1	37	26	1
C1657	3	0	0	2.6	30	26	2E
C1665	4	0	1	2.4	18	22	1
HC80-592	3	1	0	3.0	34	42	1
HC81-799	4	1	0	3.5	10	30	2E
HC81-817	3	0	0	3.3	14	48	1
K1106	4	15	0	2.6	19	64	5E
K1119	3	0	0	3.0	19	70	2E
LN82-2366	4	0	0	2.8	20	18	1
LN82-4433	3	22	0	2.6	12	52	5E
LS80-6521	4	52	0	2.8	15	54	5E
MD80-I12-1	3	23	0	3.1	23	50	4M
Md81-0953	3	0	0	3.2	14	46	2M

Exhibit D. Table 7.

UNIFORM TEST IV, 1986 Regional Summary									
No. of Tests	Yield	Rank	Maturity	Lodging	Plant Height	Seed Quality	Seed Size	Composition	
	18 bu/a	18 No.	16 Date	17 Score	18 In.	17 Score	16 g/100	Protein 5 %	Oil 5 %
Douglas	49.3	10	+4.3	2.2	39	2.8	18.7	40.4	21.5
Pyramid	44.6	17	+2.8	2.4	42	2.2	14.6	39.6	20.1
Ripley	49.9	7	-4.4	1.3	22	1.6	13.5	39.7	21.0
Chamberlain (III)	49.0	12	-7.4	2.2	38	2.7	17.7	40.4	21.2
Morgan (IV)	49.7	8	9-24.6*	2.3	40	2.1	17.7	42.6	20.6
C1653	52.3	1	-0.4	1.6	39	2.2	17.4	40.7	21.4
C1657	52.0	2	-2.9	2.3	41	2.3	16.7	40.9	20.8
C1665	49.1	11	+0.4	1.7	39	2.2	16.4	39.7	20.9
HC80-592	43.2	18	-6.1	1.2	20	2.0	17.6	41.1	22.4
HC81-799	46.2	14	-7.2	1.3	21	2.1	15.7	40.6	21.5
HC81-817	45.6	16	-1.3	1.2	19	2.0	17.6	41.0	21.7
K1106	50.3	5	-0.9	1.6	36	2.1	16.6	40.2	21.3
K1119	50.3	5	-0.1	1.8	38	1.8	13.6	40.0	21.3
LN82-2366	50.8	4	-6.4	2.0	35	2.2	16.6	40.9	21.8
LS82-4433	49.5	9	-1.8	1.7	36	2.2	16.3	40.2	21.0
LS80-6521	46.1	15	+4.8	2.4	40	1.9	15.9	39.7	21.4
Md80-IL2-1	46.8	13	+4.1	2.9	46	2.1	15.4	40.8	21.0
Md81-0953	51.0	3	+0.4	2.4	39	2.0	15.7	40.0	21.3

*129 days after planting.

Disease reactions are listed according to "Soybean Disease Survey Standards", March 1960, unless otherwise specified. Disease reaction is scored from 1 (no disease) to 5 (very severe), or in some cases as percent infected or simply as + (present) or 0 (absent). Purple seed stain and seed mottling follow the disease severity class rating:

Disease severity class rating	1	2	3	4	5
No. diseased seed in sample	0	1-3%	4-8%	9-19%	20-100%

An additional classification to describe the extent of seedcoat mottling as M (mild), E (extensive), or S (severe), is included. Pod and stem blight is rated as percent of infected seed on a four-week ("d") delayed harvest sample. The location where the test was made is identified in the column heading, and the letter "a" or "n" signifies artificial or natural infection. Clearcut and consistent reactions are given by letter instead of number: R = resistant, S = susceptible, I = intermediate, and H = heterogeneous. Natural infection ratings are from agronomic tests in some instances and from special disease planting in others. Absence of symptoms under natural infection does not necessarily mean high resistance.

<u>Abbreviation</u>	<u>Disease</u>	<u>Pathogen</u>
BB	Bacterial blight	<u>Pseudomonas syringa</u> pv. <u>glycinea</u>
BBV	Bud blight	Tobacco ringspot virus
BP	Bacterial pustule	<u>Xanthomonas campestris</u> pv. <u>phaseoli</u>
BS	Brown spot	<u>Septoria glycines</u>
BSR	Brown stem rot	<u>Phialophora gregata</u>
BTS	Bacterial tan spot	<u>Corynebacterium flaccumfaciens</u>
CN	Cyst nematode	<u>Heterodera glycines</u>
CR	Charcoal rot	<u>Macrophomina phaseolina</u>
DM	Downy mildew	<u>Peronospora manshurica</u>
FE ₁ , FE ₂	Frogeye, race 1, 2	<u>Cercospora sojae</u>
PM	Powdery mildew	<u>Microsphaera diffusa</u>
PR	Phytophthora rot	<u>Phytophthora megasperma</u> f. sp. <u>glycinea</u>
PS	Purple stain	<u>Cercospora kikuchii</u>
PSB	Pod & stem blight	<u>Diaporthe phaseolorum</u> var. <u>sojae</u>
Pyd	Pythium root rot	<u>Pythium debaryanum</u>
Pyu	Pythium root rot	<u>Pythium ultimum</u>
RK	Root knot nematode	<u>Meloidogyne</u> spp.
RP	Phizoctonia root rot	<u>Rhizoctonia solani</u>
SB	Sclerotial blight	<u>Sclerotium rolfsii</u>
SC	Stem canker	<u>Diaporthe phaseolorum</u> var. <u>caulivora</u>
SMV	Soybean mosaic	<u>Soja virus 1</u>
TS	Target spot	<u>Corynespora cassiicola</u>
WF	Wildfire	<u>Pseudomonas syringae</u> pv. <u>tabaci</u>
YMV	Yellow mosaic	<u>Phaseolus virus 2</u>

Ratings for BB, BP, DM, FE2, and PM were based on leaf symptoms; those for BSR on percent of plants with stem browning, or percent of stem length browned.

Tolerance rating categories for Phytophthora were as follows: 1 = no dead plants and no stunting; 2 = no dead plants and slight stunting or few dead plants and no stunting; 3 = few dead plants and moderate stunting or several dead plants and slight stunting; 4 = up to 50% dead plants and moderate stunting; 5 = over 50% dead plants and severe stunting.

Reference Varieties

Amcor	3.1
Zane	3.1
Pella	2.8
A3127	3.0
Harosoy	4.5
Elgin	3.4
Hoyt	4.0
Harper	3.3
Ripley	2.6

The percent germination is based on a 100 - seed sample placed on potato-dextrose agar in petri plates. Percent hard seed is based on the number of seeds in this test that did not imbibe water.

The percent green seed is based on a 100 - seed sample and is the number of seed with a green or partially green seedcoat.

Exhibit E. Statement of the Basis of Applicant Ownership.

The variety for which Plant Variety Protection is hereby sought was developed by Dr. W.T. Schapaugh, Jr., an employee of Kansas State University Experiment Station. By agreement between the employees and Kansas State University Experiment Station, all rights to any invention, discovery, or development made by the employee while employed by Kansas State University Experiment Station, were assigned by Kansas State University Experiment Station with no rights of any kind retained by the employees.